



Stability Analysis for Stochastic Neural Networks with Markovian Switching and Infinite Delay in a Phase Space

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Abstract: This paper focuses on global stochastic (asymptotic) stability for a kind of stochastic neural networks with infinite delay and Markovian switching in a fading memory phase space. Our approach is based on the Lyapunov method, stochastic analysis technique and M-matrix theory. The results complete some existing ones. Two examples are illustrated for demonstration of applicability and effectiveness of the proved theoretical theorems.

Keywords: *Markov chain; stochastic stability; neural networks; infinite delay; Lyapunov function.*

Mathematics Subject Classification (2010): 37Hxx, 37B25, 37C75.

1 Introduction

Recently, some interesting studies in the literature have been reported, such as stability of dynamical systems, especially stability of neural networks with Markovian switching and time delay [1–3, 6, 11, 18].

Thanks to the advantages given by neural networks (NNs) they have attracted much attention in these few recent years, and we have noted that the number of studies in that field has risen. NNs systems have witnessed successful applications in many areas such as securing communication systems, pattern recognition, signal processing, population dynamics systems, chemical process control and especially, in processing static images and combinatorial optimization [4]. All these applications are mainly related to the

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